

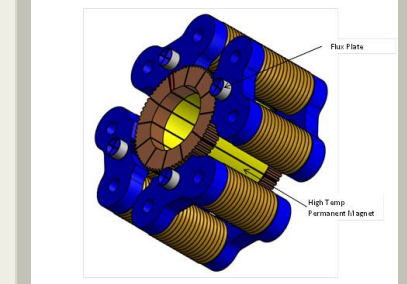
High Temperature Bell Motor, Phase I

Completed Technology Project (2013 - 2013)



Project Introduction

The National Research Council (NRC) has identified the need for motors and actuators that can operate in extreme high and low temperature environments as a technical gap to exploring deeper into our solar systems. The need for high temperature motors and actuators for robotic mechanisms is critical to explore the surface and atmosphere of Venus, Jupiter and/or Saturn. Bear Technologies, LLC (Bear) proposes to create environmentally tolerant motors for robotic missions. As identified by NRC and NASA there are no commercial actuators or motors that can work in wide variation and high temperature environments (-50 degrees Centigrade to 500 degrees Centigrade). The current approach has been to shield or isolate the environment from these systems. The problem with this approach is that it limits the ability to explore on surface, increases the bulk and is expensive with temperature control systems. The need is to create tolerant technologies that can operate in the extreme environment. Bear Technologies has been exploring motor design for more than 5 years. Currently, Bear is working on a high torque direct drive electric motor under a Phase II award. The concept proposed uses new design concepts coupled with tolerant material to create a temperature tolerant motor (TTM). The proposed motor concept has a fundamentally different design that offers higher torque and lower speed than traditional motor design. This novel design will help minimize failure risks at extreme temperatures. By combining certain extreme temperature materials with no ball bearing or lubrication, the Principle Investigator (PI) believes the motor concept has the potential to function for an increased period of time in extreme environments. Motor and actuator technologies that are capable of operating in the high-temperature (460 degrees C) and high-pressure (90 bars) Venus surface environment are needed for multiple robotic systems.



High Temperature Bell Motor

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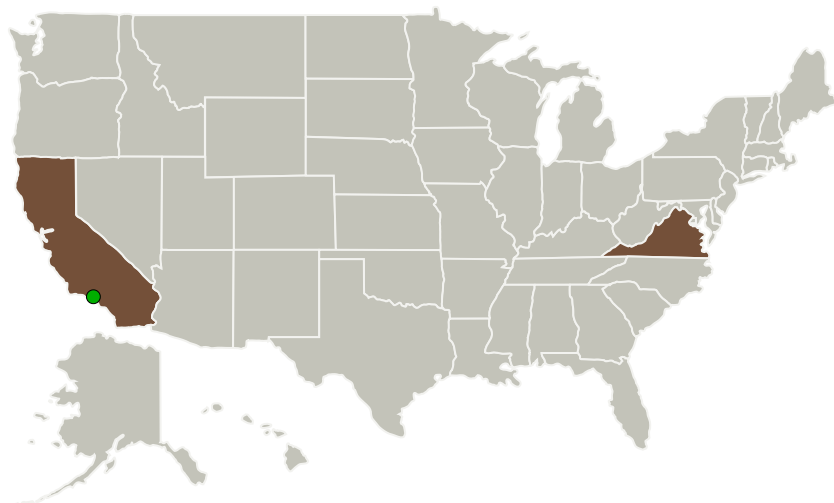
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Bear Technologies, LLC	Lead Organization	Industry Small Disadvantaged Business (SDB)	Oilville, Virginia
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California	Virginia
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Project Transitions

**May 2013:** Project Start**November 2013:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/138223>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Bear Technologies, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

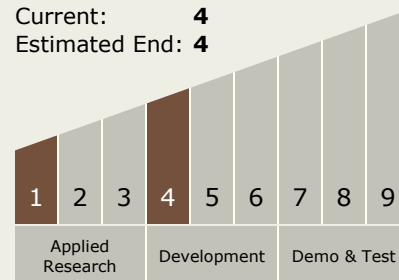
Carlos Torrez

Principal Investigator:

Jerri Ji

Technology Maturity (TRL)

Start: **1**
 Current: **4**
 Estimated End: **4**

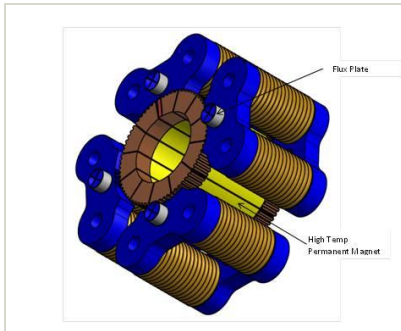


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Images



Project Image

High Temperature Bell Motor
(<https://techport.nasa.gov/image/125747>)

Technology Areas

Primary:

- TX04 Robotic Systems
 - └ TX04.2 Mobility
 - └ TX04.2.4 Surface Mobility

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System